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COOPERATIVE PROCESSING SUMMARY

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Note: Please see the "CPD Services and Facilities Guide" (PUB. PWSS 08) for publication ordering procedures.

Intended Audience:	Individuals responsible for the planning and management of information technology resources. Business analysts with technical knowledge may benefit as well.

COOPERATIVE PROCESSING SUMMARY

Introduction

Government information resources are stored and processed by a variety of microcomputers, minicomputers, and large mainframes. Increasingly, there exists the requirement to bring together data and applications in a **cooperative processing environment**. Such systems, when properly implemented, would **better fulfill business functions by using two or more computers which are concurrently interacting with each other**. The purpose of cooperative processing systems is to exploit the technical hardware and software environments of different processing and data storage systems, so that Government employees will be able to make faster, more informed decisions.

Cooperative processing involves the **integration of resources.** This integration occurs at the technical level (accessing data from a variety of hardware/software platforms), at a business level (analyzing accumulated data from the financial, legal, human resources systems, etc.), the enterprise level (sharing required data from other departments), and the global level (accessing newswire services, public databases, databases of external organizations). The development and deployment of applications using a cooperative processing approach represents the next significant epoch of computing technology. It's implications on the business of Government are, indeed, tremendous.

A task force consisting of EDP representatives from Government departments was established to determine a cooperative processing strategy for the Alberta Government. The members of this task force researched, debated, and reviewed information about cooperative processing and how it relates to the diverse computing environment of the Government. The major deliverable of the year-long project was the development of the publication, "Cooperative Processing Guidelines". Intended as a reference manual for Government system managers and developers, it covers managerial and technical information for the effective planning, implementation, operation, and maintenance of cooperative processing systems. It also outlines the services and facilities that Public Works, Supply and Services will provide in support of cooperative processing systems.

Why Cooperative Processing?

The planned, effective implementation of cooperative processing will provide a number of benefits to Government departments, and to the Government as a corporate entity:

- The productivity of information users will improve, as staff will be able to do their jobs with increased independence, having access to more corporate computing resources.

- It will be easier to integrate the portfolio of existing applications. That is, departments that develop the necessary cooperative processing skills and facilities will be better positioned to garner the islands of information scattered throughout the organization.

- Access to relevant data will be quicker and less expensive to retrieve if it resides locally. (Network transmission costs can be reduced if most of the data is stored and processed locally.)

- Highly productive application packages on microcomputer and minicomputer platforms (such as desktop publishing, spreadsheet packages, etc.) can be applied to summarized mainframe-based data resources.

- The development time and costs for computer applications may be reduced if microcomputer or minicomputer programming tools can be utilized.

- The technically-developed data storage capacity and management facilities of mainframe processors and database management tools can be used for data originating from microcomputer and minicomputer platforms.

- Efficient use of microcomputer and minicomputer processing capacity will offload processing cycles from Government mainframe computers. This will have the effect of forestalling costly upgrades to the host CPU (thereby delaying possible increases in processing rates).

- The department - and the Government as a whole - will be better positioned to take advantage of the major business trends of the 1990's, including: globalization, partnering, responsiveness to client needs, and matrix management.

- Software innovations will be integrated into the system applications with greater ease. The upcoming significant and visible breakthroughs of data processing will be introduced at the local level (on the workstation or LAN).

Generally, cooperative processing systems will allow Government departments to better serve the public and fulfill their business objectives in a more effective and responsive manner.

The Risks

Cooperative processing is a new processing methodology that requires careful planning, appropriate hardware, software, data communications tools, and skilled system integrators. The technological and financial barriers to stable, integrated cooperative processing systems are formidable:

- Suitable off-the-shelf application software may not exist for particular cooperative processing configurations.
- Development tools for the design, implementation, and maintenance of cooperative systems are immature and lacking in facilities.
- The stability of the operating environment for cooperative systems may not be sound due to the rapid changes and upgrades that are applied to each platform or processor involved in the cooperative configuration.
- The quality of information derived from numerous distributed databases may be inadequate due to database synchronization discrepancies. (One database may contain outdated or incomplete information relative to other databases.)
- The network and processors may not have the technical resources (such as capacity, speed or memory) to support particular cooperative processing configurations.

- It may be very costly to acquire the necessary hardware and software components.
- Industry standards that support cooperative processing are immature and inconsistent.
- Staff may be reluctant to accept the responsibility for the administration and maintenance of cooperative processing systems.
- Technical support and training will be difficult to manage as more processing occurs in geographically dispersed areas.
- Programmers, analysts, and managers with developed skill sets in cooperative processing environments may be difficult to recruit and/or retain.

The costs and risks can be intimidating. None the less, cooperative processing will become the processing standard through the 1990's. Appropriate skills, tool sets, and procedures must **evolve along with technology** if successful implementations are to be realized.

The Impacts of Cooperative Processing

This study of the interaction of computers is, by itself, extremely technical in nature. The "Cooperative Processing Guidelines" attempts to analyze both the technical and managerial impacts of cooperative processing, and to clarify the services that PWSS will supply to support cooperative processing initiatives undertaken by Government departments. The major chapters of this publication include:

Processing Considerations. The technical components that comprise a cooperative processing system are discussed. Various data retrieval and update configurations are presented and their relative advantages and disadvantages are reviewed. This information would be of interest to system planners and analysts who are trying to determine the optimal cooperative configuration for their processing applications.

Data Considerations. Through the 1990's there will be a dramatic increase in the volume of data that is stored within decentralized systems administered by remote work groups. This challenges management to maintain the integrity of data resources as more people access and update them. Issues related to the security, sharing, administration, and management of data resources within a distributed, cooperative processing environment are analyzed.

Application Systems. The development and maintenance of computer systems represents a considerable financial commitment to Government departments. Current trends indicate that over 50% of new development will be done in a distributed development environment by 1995. This chapter reviews the technical merits of tools available to develop cooperative processing applications as well as various management considerations associated with the reuse of developed systems.

Ongoing Support. Some of the most significant managerial issues related to cooperative processing involve the ongoing support of such systems. The return on investment of hardware, software and communications facilities is reduced if technical support is not readily available, or if users are not adequately trained to use or maintain the systems. Strategies associated with the ongoing support of cooperative systems are presented.

Issues. This chapter comments on the various technical and managerial issues that can have extensive, long-term consequences on the cost, vitality, and overall success of cooperative processing systems within Government departments. Topics include the development of a data processing architecture, standards-setting, and the effects of cooperative processing on Government employees.

The appendices of the publication also contain a pot-pourri of case studies, sample management policies, and models that may assist systems managers and developers in the planning of cooperative systems.

Recommendations

The concepts presented in the "Cooperative Processing Guidelines" publication are a starting point for Government departments that are considering the implementation of cooperative processing systems. They are intended to ease the transition from traditional stand-alone and/or mainframe-centric systems, so that the benefits of this new processing approach can be realized. Following are some recommendations for Government departments that are considering the development and implementation of cooperative processing applications:

- Develop an understanding of various cooperative processing configurations, the relative advantages and disadvantages of each, and how they can be best used for particular processing applications.

- Determine the current and anticipated data communication requirements for the network in terms of protocols and standards, connectivity, volumes of data transmitted, speed/response time, network management facilities, and geographic distribution.

- Develop a comprehensive distributed data management strategy that would identify and educate data owners, users, and custodians.

- Evaluate system development tools and languages so that stable cooperative processing systems can be quickly developed, easily maintained, and efficiently shared with other areas within the department and/or Government.

- Determine a strategy for providing ongoing support, training, and software management facilities to analysts, end-users, and administrators so that the integrity of distributed cooperative processing systems is maintained.

- Prepare a strategic architecture for cooperative systems which would incorporate a review of standards, security measures, hardware platforms, and operating systems.

- Evaluate the potential impacts of cooperative processing systems on Government staff, the public, and external organizations so that the implementation, use, and maintenance of such systems are optimized.

These are just a few of the high-level recommendations that the "Cooperative Processing Guidelines" provides for system planners and management. Further details are contained in the publication. As well, support branches within PWSS are available to assist Government departments in preparing strategies for various aspects of cooperative processing.

Conclusion

Cooperative processing will be the pervasive form of data processing and storage in the 1990's. Improvements in end-user productivity will be realized as users benefit from the common "look and feel" and standard capabilities of workstation environments. Mainframe-based systems will exploit these advanced presentation capabilities as well, as they provide the workstation user with readable information from centralized databases. The easy access to enterprise-wide information sources will allow greater use of the system by senior management and professionals within Government departments. As a result, the applications that will be deployed will offer significantly higher strategic value to the Government than conventional transaction-based systems. Ultimately, the public will benefit, as it will be served by Government employees that are equipped to be responsive to their needs.

A growing number of business organizations are developing systems with a cooperative processing orientation. That is, by default, new development uses a cooperative processing approach while **any other** design method should be justified. Through the 1990's, Government departments will assume this orientation as well, due to the strategic, technical, and economic incentives cooperative processing provides.

To address the ongoing issues associated with the cooperative processing architecture, a Government user group has been established to review the issues and concepts in greater depth. This venue will provide current, practical information for the implementation of cooperative systems, so that better leadership and management of such systems will occur.

The emergence of cooperative processing in the 1990's is as significant as the transition from batch to online processing in the 1970's. It is hoped that the sharing of experiences through the user group and the material contained within the "Cooperative Processing Guidelines" will better prepare Government departments for this valuable processing strategy.

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